Wedging

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The wedge in the door

It was during one of our weekly Skype calls that a synthetic biologist suggested what was to become the guiding metaphor for the Synthetic Aesthetics project: the wedge in the door. After three years of working together across disciplines and time zones, this conversation was one of the most significant moments. The metaphor worked for all of us on the project team: for the two synthetic biologists, for the critical designer, and for me and the other social scientific researcher. The brute physicality of a wedge was appealing. The door on synthetic biology was closing, and our project (and the book that we were writing together) would attempt to stop it from doing so.

The three 'disciplines' brought together by the Synthetic Aesthetics project (synthetic biology, critical design, and science and technology studies) are themselves hybrid, heterogeneous and relatively young. There were many things that we did not share, but the wedge became something that connected us. The closing that we were all resisting was the industrialization of biology. We wanted to prevent synthetic biology following unimaginative and entrenched paths – from becoming myopic and monolithic. The synthetic biologists did not want to see their field simply providing 'drop-in' biologically derived replacements for petrochemicals. Instead they aimed to harness the complexity of biology in a manner that was sympathetic to its capabilities (Elfick and Endy 2014). The critical designers wanted to make speculative artefacts that would challenge the futures that are imagined by dominant groups, by exploring ideas such as futility, frivolity and disgust. For me, resisting industrialization meant drawing attention to the fact that there are different ways of imagining how (or whether) we should make use of our increased powers to manipulate the biological world.

This might come across as an argument that participants in an interdisciplinary project should identify and adopt a guiding metaphor, but the wedge was more than a conveniently sharable metaphor, because it expressed a concern with keeping possibilities open, something that was central to our interdisciplinary endeavour. It is also significant that the idea emerged from our collaborative work. It was not a tool developed by one group (e.g. social scientists) to study another (e.g. synthetic

biologists). This experience demonstrates the methodological importance of valuing the unplanned and emergent in interdisciplinary research.

The Synthetic Aesthetics project

The Synthetic Aesthetics project itself was born three years earlier, at a week-long residential 'sandpit' event held in a remote hotel outside Washington DC, and funded by the UK's Engineering and Physical Sciences Research Council and the US's National Science Foundation. Sandpits involve real-time proposal writing and peer review, and grants are awarded on the final day. This rather unusual funding mechanism meant that many of the constraints of more conventionally funded projects (such as pre-defined outputs) were absent in Synthetic Aesthetics, giving us a considerable amount of freedom.

After the sandpit, the project team selected and then paired six scientists/engineers with six artists/designers. The pairs were tasked with investigating design in synthetic biology, with the freedom to take their work in any direction they chose. They were funded to spend time in each other's workspaces, and, somewhat unusually for projects of this sort, the scientists and engineers spent the same amount of time in the art/design studio as the artists spent in the science laboratory.

To give a snapshot of some of the resulting work: one pair looked at synthetic biology from the perspective of geological time (the sweep of which extends from the beginning to the end of the Earth), another made cheeses from the bacteria that grow on human skin, and another explored how plant cells 'compute' using shape and form. Significantly, all the pairs engaged in designing *with* biology rather than the design *of* biology. Their work highlighted the interconnectedness and evolution of living systems, the different dimensions of biological temporality, and our coexistence with our bacterial symbionts. The result of the project was a hardback, picture-filled book (Ginsberg, Calvert, Schyfter, Elfick and Endy 2014), substantial enough to be used as a doorstop.

Opening up

One of the reasons why the wedge in the door was instantly appealing to me is because, by resisting closure, I saw it as a form of 'opening up' – an idea I have found myself returning to repeatedly in my work in the highly politicized field of synthetic

biology. Stirling (2008) describes opening up in policy contexts as drawing attention to the often implicit framing conditions and assumptions that underlie discussions of a technology, which he argues can enable new questions to be asked, neglected issues to be addressed, and alternative technological pathways to be explored.

In my experience, interdisciplinary work can provide unique opportunities for opening up. For example, in the Synthetic Aesthetics project we all engaged in challenging and expanding each other's ideas about the future(s) of synthetic biology, as well as each other's ways of seeing the world. The latter is, for me, one of the thrills of interdisciplinary collaboration. It might be exciting, but opening up is not always comfortable, of course. If a crevasse opens up you can fall into it, or at the very least get vertigo (as experienced by Agre (1997) on transitioning from the technical to the social sciences). We all needed to move away from the edge and return to our (rather unstable) disciplinary homes with something to show for our joint efforts.

Valuing interdisciplinary work

The value of both the Synthetic Aesthetics project and the book that we produced together has always been difficult to negotiate. The book itself was an unsatisfactory compromise for the artists and designers, who would have valued an exhibition far more. Although the academics on the project did receive institutional approval for engaging with professionals from outside the academy (ticking the 'impact' box), the project was simultaneously devalued by some for not being 'science' and, despite our best efforts, it has consistently been misinterpreted as PR or 'outreach' for the field of synthetic biology.

This is clearly problematic for me as a social scientist in respect to my own professional accountability, and also because it does not capture the value of what I found to be uniquely stimulating work, which I think embraced the social scientific virtue of critique. I have no interest in delivering artistically mediated outreach for synthetic biology projects in the future, but this is something that the synthetic biology community values highly, particularly in the context of perceived problems with public acceptance of the technology (see Marris 2015).

Outreach is the one-way dissemination of a particular worldview, but a wedge, in contrast, is something that stops, obstructs and resists closure. It is a metaphor that allows for dissonance, disagreement and ongoing challenge. But despite its crude

force, as we all know from experience, attempts at wedging doors often fail, and spaces that were once open can close again (Callard and Fitzgerald 2015). As yet, it is too early to judge whether or not we were successful in our shared endeavour to stop synthetic biology from closing.

We did not write about the metaphor of the wedge in the door in the Synthetic Aesthetics book because the critical designer on the project team regarded it as 'too self-deprecating'. Admittedly no one wants their published book to be used for a mundane physical task of propping a door open (although as Latour (1992) has shown, the value of such mundane objects should not be taken for granted). The wedge might be a rather unsophisticated device, but I have decided to revive it here because its simplicity and force have stayed with us all as we have moved on to new work.

Six years after the project first started, one of the synthetic biologists emailed the project team. The email had no content apart from an attached image – a black foreground entitled 'industrialization of biology' and a door opening in the blackness, wedged open by our book, with blue skies beyond.

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